African Digital Media Studies (Media/Social focus)

Methodological Evaluation of Smallholder Farm Systems in Rwanda Using Panel Data for Cost-Effectiveness Analysis

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Abstract

Smallholder farming systems in Rwanda are crucial for food security and economic development. Understanding their cost-effectiveness is essential for policy-making. Panel data from 10 years of agricultural surveys were analysed using a fixed effects regression model to estimate the impact of input usage and labour allocation on output yields. A significant increase in fertilizer use was observed (35%) among smallholder farms, leading to a 20% boost in maize yield per hectare. Variability in irrigation access explained up to 15% of productivity differences between households. The fixed effects model provides robust estimates of the cost-effectiveness of different farm management practices. Investment in agricultural extension services targeting smallholder farmers with limited access to inputs is recommended for enhancing yields and reducing costs. Smallholder farms, panel data analysis, cost-effectiveness, Rwanda Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Rwandan, Smallholder, Panel, Econometrics, Stochastic Frontier, Efficiency, Spatial Analysis*

ABSTRACT-ONLY PUBLICATION

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